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^{r} revised
x suppressed to meet the confidentiality requirements of the *Statistics Act*
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Abstract

Background: A large literature exists on the association between child abuse and mental health, but less is known about associations with physical health. The study objective was to determine if several types of child abuse were related to an increased likelihood of negative physical health outcomes in a nationally representative sample of Canadian adults.

Data and methods: Data are from the 2012 Canadian Community Health Survey—Mental Health (n = 23,395). The study sample was representative of the Canadian population aged 18 or older. Child physical abuse, sexual abuse, and exposure to intimate partner violence were assessed in relation to self-perceived general health and 13 self-reported, physician-diagnosed physical conditions.

Results: All child abuse types were associated with having a physical condition (odds ratios = 1.4 to 2.0) and increased odds of obesity (odds ratios = 1.2 to 1.4). Abuse in childhood was associated with arthritis, back problems, high blood pressure, migraine headaches, chronic bronchitis/emphysema/COPD, cancer, stroke, bowel disease, and chronic fatigue syndrome in adulthood, even when sociodemographic characteristics, smoking, and obesity were taken into account (odds ratios = 1.1 to 2.6). Child abuse remained significantly associated with back problems, migraine headaches, and bowel disease when further adjusting for mental conditions and other physical conditions (odds ratios = 1.2 to 1.5). Sex was a significant moderator between child abuse and back problems, chronic bronchitis/emphysema/COPD, cancer, and chronic fatigue syndrome, with slightly stronger effects for women than men.

Interpretation: Abuse in childhood was associated with increased odds of having 9 of the 13 physical conditions assessed in this study and reduced self-perceived general health in adulthood. Awareness of associations between child abuse and physical conditions is important in the provision of health care.

Keywords: Child abuse, chronic disease, health status, obesity, smoking.

Child abuse is recognized as having adverse life-long consequences.[1,2] In Canada, 32% of a nationally representative adult sample indicated that they had experienced physical abuse, sexual abuse, and/or exposure to intimate partner violence during childhood.[3] While many studies have reported associations between a history of child maltreatment and mental disorders,[4-10] less is known about associations with physical health.

Studies of the relationship between child abuse and physical health have tended to involve clinical or at-risk samples not representative of the general population, one or two types of abuse, and a limited number of physical conditions.[11-13] Few studies have examined sex differences in the relationship between child abuse and physical health. In addition, no studies have investigated associations between several types of abuse in childhood and multiple physical health outcomes in a representative sample of Canadian adults.

The current analysis addresses many of these gaps. It is based on a representative national sample and examines three types of child abuse (physical abuse, sexual abuse, and exposure to intimate partner violence), 13 physical conditions, and self-perceived health. To investigate relationships between specific types of child abuse and specific physical conditions and sex differences, the models are adjusted for potential confounders, including sociodemographic characteristics, smoking, obesity, mental disorders, and other physical conditions and types of child abuse.

The objectives are to estimate: 1) the prevalence of abuse in childhood among people aged 18 or older, by the presence of chronic physical conditions; 2) associations between different types of child abuse and self-perceived health; 3) associations of child abuse types and number of child abuse types with physical conditions; and 4) sex differences in associations between abuse in childhood and physical health in adulthood. It is hypothesized that: child abuse is associated with increased odds of physical conditions and poorer s>elf-perceived health; a dose-response relationship exists, with exposure to more types of child abuse associated with higher odds of physical conditions; and findings vary by sex.

Data and methods

Sample

Data are from the 2012 Canadian Community Health Survey—Mental Health (CCHS—2012), a national cross-sectional survey conducted by Statistics Canada. A multi-stage stratified cluster sampling design was used to obtain a representative sample of respondents aged 15 or older in the 10 provinces. Fewer than 3% of the population were excluded from the sampling frame: people living on reserves and other Aboriginal settlements, full-time members of the Canadian Forces, and the institutionalized population.[14]

The national household- and individual-level response rates were 79.8% and 68.9%, respectively.[14] Most interviews (87%) were conducted in person using computer-assisted interviewing. Because of the sensitive nature of the child abuse questions, only respondents aged 18 or older were asked these items (n = 23,395). Respondents were informed about the privacy and confidentiality provisions, and the voluntary nature of the

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CCHS—2012, and were required to give their consent before participating.[15] The data were de-identified; that is, identification of respondents is not possible. In addition, all files were vetted by Statistics Canada to ensure that privacy and confidentiality guidelines were maintained.

Child abuse

The CCHS—2012 assessed physical abuse, sexual abuse, and exposure to intimate partner violence using The Childhood Experiences of Violence Questionnaire (CEVQ).[16] All items referred to occurrences before age 16. Responses were provided on an ordinal scale. In accordance with the CEVQ guidelines, responses were dichotomized as the presence or absence of history of child abuse.

Physical abuse was present if at least one of the following criteria was met: 1) being slapped on the face, head or ears or hit or spanked with something hard three times or more; 2) being pushed, grabbed, shoved, or having something thrown at the respondent three times or more; or 3) being kicked, bit, punched, choked, burned, or physically attacked at least once.

Sexual abuse was present if respondents experienced either of the following at least once: 1) attempts or being forced into unwanted sexual activity by being threatened, held down, or hurt; or 2) sexually touched, meaning unwanted touching or grabbing, kissing, or fondling against their will.

Exposure to intimate partner violence was present if respondents saw or heard parents, step-parents or guardians hitting each other or another adult in the home three times or more.[16]

Variables were computed to determine the experience any child abuse (one or more types) and the number of types experienced (zero to three types).

Covariates

Age group, sex, visible minority (self-reported yes or no), birthplace (self-reported Canada or other), level of education, past-year household income (in categories), marital status, current smoking status, and obesity were included as covariates in the models. Smoking status was coded as: never-smoker, former occasional smoker, former daily smoker, current occasional smoker, or current daily smoker. Body mass index (BMI) was calculated from self-reported height and weight (excluding pregnant women). BMI classifications were based on Health Canada and World Health Organization (WHO) recommendations, and modified using the Canadian standard.[17] Obesity was defined as a BMI of 30 or more.

Mental disorders

Lifetime axis I disorders diagnoses were made using the WHO version of the Composite International Diagnostic Interview, which was based on criteria of the Diagnostic and Statistical Manual of Mental Disorders Fourth Edition (DSM-IV).[17,18] The disorders were: depression, bipolar disorder, generalized anxiety disorder, alcohol abuse/dependence, and drug abuse/dependence. Additional mental conditions were determined from self-reports by asking respondents if they had a long-term health condition diagnosed by a health professional that had lasted or was expected to last six months or more: obsessive-compulsive disorder, post-traumatic stress disorder, panic disorder, a phobia, a learning disability, attention deficit disorder, and an eating disorder. Mental disorders and conditions were included as covariates in the adjusted models to determine if a significant relationship existed between child abuse and physical health, independent of these mental disorders.

Physical health

The analysis assessed 13 self-reported, physician-diagnosed chronic physical conditions. Respondents were asked if they had a long-term health condition diagnosed by a health professional that was expected to last or had lasted six months or more. The specific conditions were: asthma; arthritis (excluding fibromyalgia); back problems (excluding fibromyalgia and arthritis); high blood pressure; migraine headaches; chronic bronchitis/emphysema/chronic obstructive pulmonary disease (respondents aged 35 or older); diabetes; epilepsy; heart disease; cancer; stroke; bowel disease (Crohn's disease, ulcerative colitis, irritable bowel syndrome, bowel incontinence); and chronic fatigue syndrome.

Respondents also rated their physical health as excellent, very good, good, fair, or poor.

Statistical analysis

The analyses were weighted to ensure that the sample was representative of the Canadian population aged 18 or older. To address the complexity of the survey design, bootstrapping was applied to all analyses as a variance estimation technique. The distribution of sociodemographic characteristics, smoking, and obesity by any physical condition was computed. The prevalence of physical conditions across different types of child abuse was then determined. Multinomial logistic regression models were used to examine relationships between child abuse and self-perceived general health, adjusting for sociodemographic characteristics (adjusted odds ratio (AOR-1)). Logistic regression models were used to examine associations between abuse in childhood abuse and physical conditions in adulthood. Nested models were first adjusted for sociodemographic characteristics, smoking, and obesity (AOR-1), and then for mental disorders, other physical conditions, and other types of child abuse (AOR-2). Finally, sex differences in the relationships between abuse in childhood and physical health in adulthood were examined using interaction terms and adjusting for sociodemographic characteristics. Lack of multicollinearity among covariates was determined for all models.

Results

A number of sociodemographic and lifestyle factors were associated with having a physical condition. The prevalence was higher among women than men and rose

with age (Table 1). Higher education and higher household income were associated with a reduced prevalence. Relative to never-smokers, occasional and daily smokers and current daily smokers had elevated odds of having a physical condition (ORs from 1.1 to 2.2). Obesity was also associated with having a physical condition.

All types of child abuse were associated with an increased likelihood of having a physical condition, with odds ranging from 1.4 for being slapped on the face, head or ears or hit or spanked with something hard to 2.0 for sexual abuse (Table 2).

When sociodemographic characteristics were taken into account, physical abuse (AOR = 1.2; 95% CI = 1.1 to 1.4), sexual abuse (AOR = 1.4; 95% CI = 1.1 to 1.6), and exposure to intimate partner violence (AOR = 1.3; 95% CI = 1.1 to 1.6) in childhood were associated with increased odds of obesity in adulthood (data not shown).

As well, people who experienced child abuse were more likely than those who had not to report their health as less than excellent (very good, good, fair, poor) (Table 3).

Experiencing any type of child abuse was associated with increased odds of arthritis, back problems, high blood pressure, migraine headaches, chronic bronchitis/emphysema/COPD, cancer, stroke, bowel disease, and chronic fatigue syndrome, when adjusting for sociodemographic characteristics, smoking, and obesity (AOR-1) (Table 4). Each type of child abuse was associated with six conditions—arthritis, back problems, migraine headaches, cancer, bowel disease, and chronic fatigue syndrome. Additionally, physical abuse was associated with high blood pressure and stroke; sexual abuse was associated with chronic bronchitis/emphysema/COPD and diabetes; and exposure to intimate partner violence was associated with chronic bronchitis/emphysema/COPD. Regardless of further adjustments for mental disorders, other physical health conditions, and other types of child abuse, significant relationships remained between physical abuse and back problems, migraine headaches, and stroke, and between exposure to intimate partner violence and migraine headaches (AOR-2).

Table 1
Sociodemographic characteristics, smoking status, and obesity, by presence of physical condition, household population aged 18 or older, Canada excluding territories, 2012

Sociodemographic characteristics, smoking status, obesity	No physical condition	Any physical condition		95% confidence interval	
	%	%	Odds ratio	from	to
Sex					
Men†	54.2	45.0	1.0	...	...
Women	45.8	55.0	1.4***	1.3	1.6
Age group (years)					
18 to 34†	43.0	16.0	1.0	...	...
35 to 49	30.9	23.3	2.0***	1.8	2.3
50 to 64	20.5	32.3	4.2***	3.7	4.8
65 or older	5.6	28.4	13.7***	11.8	15.9
Education					
Less than secondary school graduation†	10.0	18.7	1.0	...	...
Secondary school graduation	16.7	16.1	0.5***	0.4	0.6
Some postsecondary	7.7	6.1	0.4***	0.3	0.5
Postsecondary certificate/diploma	37.7	38.7	0.6***	0.5	0.6
University degree (bachelor's or higher)	28.0	20.4	0.4***	0.3	0.5
Household income					
$29,999 or less†	12.3	20.5	1.0	...	...
$30,000 to $49,999	16.0	20.3	0.8**	0.7	0.9
$50,000 to $79,9999	24.2	25.4	0.7***	0.6	0.8
$80,0000 or more	47.0	33.8	0.4***	0.4	0.5
Marital status					
Married/Common-law†	59.7	66.0	1.0	...	...
Never married	31.9	16.3	0.5***	0.4	0.5
Separated/Divorced/Widowed	8.4	17.8	1.9***	1.6	2.2
Visible minority					
No†	71.1	82.1	1.0	...	...
Yes	28.9	17.9	0.5***	0.5	0.6
Country of birth					
Canada†	70.2	76.0	1.0	...	...
Other	29.9	24.0	0.7***	0.7	0.8
Smoking status					
Non-smoker†	43.3	33.8	1.0	...	...
Former occasional smoker	17.1	15.3	1.1*	1.0	1.3
Former daily smoker	17.2	30.1	2.2***	2.0	2.5
Current occasional smoker	7.4	4.0	0.7***	0.6	0.9
Current daily smoker	15.0	17.0	1.4***	1.3	1.6
Obesity					
Body mass index less than 30†	86.7	76.1	1.0	...	...
Body mass index 30 or more	13.3	23.9	2.0***	1.8	2.3

... not applicable
* significantly different from reference category ($p < 0.05$)
** significantly different from reference category ($p < 0.01$)
*** significantly different from reference category ($p < 0.001$)
† reference category
Note: Because of rounding, a confidence interval with 1.0 as the lower limit was significant.
Source: 2012 Canadian Health Measures Survey—Mental Health.

A general trend emerged—as the number of types of child abuse experienced increased, so did the odds of most conditions (Table 5).

When interaction effects between sex and any child abuse were examined,

Table 2
Prevalence and odds ratios relating abuse in childhood to physical conditions, household population aged 18 or older, Canada excluding territories, 2012

	No physical condition	Any physical condition	Unadjusted odds ratio	95% confidence interval	
	%	%		from	to
Any child abuse					
No†	72.5	64.1	1.0	...	...
Yes	27.5	36.0	1.5***	1.3	1.6
Any physical abuse					
No†	77.4	71.0	1.0	...	...
Yes	22.6	29.0	1.4***	1.3	1.6
Slapped on face, head, ears/Hit or spanked with something hard					
No†	80.8	75.2	1.0	...	...
Yes	19.2	24.8	1.4***	1.2	1.6
Pushed, grabbed, shoved, something thrown at					
No†	92.0	87.4	1.0	...	...
Yes	8.0	12.6	1.7***	1.4	1.9
Kicked, bit, punched, choked, burned, attacked					
No†	93.0	87.8	1.0	...	...
Yes	7.0	12.2	1.8***	1.6	2.1
Sexual abuse					
No†	93.1	87.2	1.0	...	...
Yes	7.0	12.8	2.0***	1.7	2.3
Exposure to intimate partner violence					
No†	93.9	90.6	1.0	...	...
Yes	6.1	9.4	1.6***	1.3	1.9

... not applicable
*** significantly different from reference category ($p < 0.001$)
† reference category
Source: 2012 Canadian Community Health Survey—Mental Health.

What is already known on this subject?

- Almost a third of a nationally representative sample of Canadian adults indicated that they had experienced physical abuse, sexual abuse, and/or exposure to intimate partner violence during childhood.
- An extensive literature exists on relationships between abuse in childhood and mental health, but less is known about associations with physical health.
- Most studies showing links between child maltreatment and adult physical health were based on surveys conducted in the United States.

What does this study add?

- With data from the 2012 Canadian Community Health Survey—Mental Health, physical abuse, sexual abuse, and exposure to intimate partner violence during childhood were examined in relation to self-perceived general health and 13 self-reported, physician-diagnosed chronic conditions among people aged 18 or older.
- Experiencing abuse in childhood was associated with increased odds of having 9 of the 13 physical conditions and reduced self-perceived general health in adulthood.
- Effects were slightly stronger for women than men.

significant effects were noted for back problems (AOR for the interaction term = 1.2; 95% CI = 1.0 to 1.5), chronic bronchitis/emphysema/COPD (AOR for the interaction term = 2.0; 95% CI = 1.3 to 3.0), cancer (AOR for the interaction term = 1.8; 95% CI = 1.3 to 2.4), and chronic fatigue syndrome (AOR for the interaction term = 2.3; 95% CI = 1.1 to 2.5). In all cases, the effects were slightly stronger for women than for men.

Discussion

The findings of this study support the research hypotheses—child abuse was associated with increased odds of physical conditions and poor self-perceived health; a dose-response pattern was observed, with the number of child abuse types experienced corresponding to increased odds of some conditions; and sex differences emerged for associations between child abuse and back problems, chronic bronchitis/emphysema/COPD, cancer, and chronic fatigue syndrome, with slightly stronger effects for women. Overall, associations between child abuse and physical conditions were non-specific; no clear differentiation was apparent between particular types of child abuse and specific physical conditions.

Even when sociodemographic characteristics, obesity, and smoking were taken into account, all child abuse types were associated with several physical conditions. Further adjustments for mental conditions, other physical conditions, and other child abuse types yielded unique relationships between physical abuse and back problems and stroke; no other unique relationships between specific types of child abuse and specific physical conditions were noted. Physical abuse and exposure to intimate partner violence were both associated with migraine headaches when adjusting for sociodemographic characteristics, obesity, smoking, mental conditions, other physical conditions, and other types of child abuse.

The findings of this study are generally consistent with the literature. Results of surveys, most of which were conducted in the United States, show associations between child maltreatment and adult physical health, including reduced health-related quality of life, pain, poor or fair self-rated health, and frequent emergency department visits.[11-13,19-32]

Table 3
Prevalence and adjusted odds ratios (AOR) relating self-perceived health to abuse in childhood, household population aged 18 or older, Canada excluding territories, 2012

		Physical abuse					
Self-perceived health	Any child abuse	Any physical abuse	Slapped on face, head, ears/Hit or spanked with something hard	Pushed, grabbed, shoved, something thrown at	Kicked, bit, punched, choked, burned, attacked	Sexual abuse	Exposure to intimate partner violence
Excellent[!]							
% (standard error)	18.3 (0.8)	19.4 (0.7)	18.5 (1.0)	13.3 (1.0)	14.3 (1.2)	16.1 (1.1)	14.6 (1.3)
AOR-1 (95% confidence interval)	1.00 (...)	1.00 (...)	1.00 (...)	1.00 (...)	1.00 (...)	1.00 (...)	1.00 (...)
Very good							
% (standard error)	36.9 (0.9)	37.9 (0.8)	37.5 (1.2)	35.5 (1.8)	33.0 (1.8)	35.2 (1.5)	34.2 (2.0)
AOR-1 (95% confidence interval)	1.3*** (1.1, 1.4)	1.2** (1.1, 1.4)	1.3** (1.1, 1.5)	1.6*** (1.3, 2.0)	1.3* (1.1, 1.7)	1.3* (1.0, 1.6)	1.3* (1.0, 1.7)
Good							
% (standard error)	31.0 (1.0)	31.0 (0.8)	31.1 (1.2)	33.2 (1.5)	31.7 (1.6)	31.5 (1.5)	34.0 (2.0)
AOR-1 (95% confidence interval)	1.5*** (1.3, 1.7)	1.5*** (1.3, 1.7)	1.5*** (1.3, 1.7)	2.0*** (1.6, 2.4)	1.7*** (1.3, 2.1)	1.5*** (1.2, 1.8)	1.8*** (1.4, 2.2)
Fair							
% (standard error)	10.5 (0.6)	9.1 (0.4)	10.0 (0.7)	13.3 (1.1)	15.8 (1.3)	12.6 (1.0)	12.7 (1.3)
AOR-1 (95% confidence interval)	2.2*** (1.8, 2.7)	2.2*** (1.8, 2.7)	2.0*** (1.6, 2.5)	3.2*** (2.4, 4.2)	3.4*** (2.5, 4.5)	2.2*** (1.8, 2.9)	2.5*** (1.8, 3.4)
Poor							
% (standard error)	3.3 (0.3)	2.7 (0.2)	2.9 (0.3)	4.7 (0.6)	5.3 (0.7)	4.7 (0.6)	4.5 (0.6)
AOR-1 (95% confidence interval)	2.9*** (2.2, 3.7)	2.9*** (2.2, 3.8)	2.3*** (1.7, 3.1)	4.4*** (3.2, 6.3)	4.4*** (3.1, 6.2)	3.1*** (2.3, 4.3)	3.4*** (2.4, 4.9)

... not applicable
* significantly different from reference category ($p < 0.05$)
** significantly different from reference category ($p \leq 0.01$)
*** significantly different from reference category ($p \leq 0.001$)
! reference category
AOR-1 = adjusted for age, sex, visible minority status, country of birth, education, household income, and marital status
Note: Because of rounding, confidence intervals with 1.0 as the lower limit were significant.
Source: 2012 Canadian Community Health Survey—Mental Health.

For instance, a study based on data collected in 2004 and 2005 by the U.S. National Epidemiological Survey on Alcohol and Related Conditions reported that people who had been grabbed, shoved, hit, and slapped when they were children had increased odds of developing cardiovascular disease, arthritis, and obesity in adulthood; more serious child maltreatment (severe physical abuse, sexual abuse, exposure to intimate partner violence, and/or neglect) was associated with each of the seven physical conditions that were assessed—arteriosclerosis or hypertension, hepatic disease, diabetes, other cardiovascular disease, gastrointestinal disease, arthritis, and obesity.[33] In addition, the prevalence of obesity and having any physical condition was greater among women who experienced child maltreatment, and among men who experienced harsh physical punishment.[33]

Despite the general consistency of CCHS—MH findings with other research, a few exceptions are apparent. No relationship was found between child abuse and asthma, although it has been noted in previous work.[31,34,35] This may, in part, be attributable to differences in sampling (population versus clinical samples), measurement (self-reported asthma versus physician-diagnosed), and study design (cross-sectional versus prospective). A recent systematic review indicated that evidence supporting the relationship between childhood adversity and asthma onset remains inconsistent.[36]

Several explanations for the relationship between child abuse and poor physical health are possible. Infants who experience abuse have high hormonal reactivity to stress.[37,38] The link between child abuse and physical health may also reflect physiologic responses to violence. Exposure to abuse may affect the hypothalamus-pituitary adrenal axis, leading to excess secretion of cortisol and consequent physiological responses such as increased heart rate and blood pressure.[25,39-42] A review of the literature concluded that, based on neuroimaging and neurochemical and proton spectroscopy data, individuals exposed to abuse and violence have acute, subacute, and chronic changes in the brain, particularly related to the hypothalamic-pituitary-adrenal axis.[43] Child abuse can also alter patterns of sleep,[44] which may worsen physical symptoms.[25] As well, child abuse and neglect are associated with alterations in the immune system—markers of systemic inflammation appear to be more common among children and adults exposed to maltreatment.[25,40,45-47] Indirect pathways between child abuse and

Table 4
Adjusted odds ratios (AOR) relating selected physical conditions to abuse in childhood, household population aged 18 or older, Canada excluding territories, 2012

		Physical abuse					
Physical condition	Any child abuse	Any physical abuse	Slapped on face head, ears/Hit or spanked with something hard	Pushed, grabbed, shoved, something thrown at	Kicked, bit, punched, choked, burned, attacked	Sexual abuse	Exposure to intimate partner violence
Asthma							
AOR-1 (95% confidence interval)	1.1 (0.89, 1.3)	1.1 (0.9, 1.3)	1.1 (0.9, 1.3)	1.4* (1.1, 1.8)	1.1 (0.9, 1.4)	1.2 (0.9, 1.5)	1.2 (0.9, 1.6)
AOR-2 (95% confidence interval)	0.9 (0.7, 1.0)	0.9 (0.8, 1.1)	0.9 (0.7, 1.2)	1.4 (0.9, 2.0)	0.8 (0.6, 1.1)	0.9 (0.7, 1.2)	0.9 (0.6, 1.2)
Arthritis							
AOR-1 (95% confidence interval)	1.4*** (1.3, 1.6)	1.4*** (1.3, 1.6)	1.4*** (1.2, 1.6)	2.0*** (1.6, 2.5)	1.8*** (1.4, 2.3)	1.4*** (1.2, 1.6)	1.8*** (1.4, 2.3)
AOR-2 (95% confidence interval)	1.1 (1.0, 1.3)	1.1 (0.9, 1.2)	0.9 (0.7, 1.0)	1.4** (1.1, 1.8)	1.1 (0.9, 1.5)	1.0 (0.8, 1.2)	1.1 (0.9, 1.5)
Back problems							
AOR-1 (95% confidence interval)	1.6*** (1.4, 1.7)	1.6*** (1.4, 1.8)	1.6*** (1.4, 1.8)	1.7*** (1.5, 2.0)	1.8*** (1.5, 2.1)	1.5*** (1.3, 1.7)	1.7*** (1.4, 2.0)
AOR-2 (95% confidence interval)	1.2** (1.1, 1.4)	1.2* (1.0, 1.4)	1.2* (1.0, 1.5)	1.0 (0.8, 1.2)	1.1 (0.9, 1.4)	1.0 (0.9, 1.2)	1.0 (0.8, 1.3)
High blood pressure							
AOR-1 (95% confidence interval)	1.1* (1.0, 1.3)	1.2** (1.1, 1.4)	1.2* (1.0, 1.4)	1.2* (1.0, 1.4)	1.3** (1.1, 1.6)	1.0 (0.9, 1.2)	1.0 (0.8, 1.2)
AOR-2 (95% confidence interval)	1.0 (0.9, 1.1)	1.1 (0.96, 1.3)	1.1 (0.9, 1.3)	1.0 (0.8, 1.3)	1.2 (0.96, 1.5)	0.9 (0.7, 1.0)	0.9 (0.7, 1.1)
Migraine							
AOR-1 (95% confidence interval)	1.9*** (1.6, 2.2)	2.0*** (1.6, 2.3)	1.9*** (1.6, 2.3)	2.3*** (1.9, 2.9)	2.4*** (1.9, 3.0)	1.7*** (1.4, 2.1)	2.3** (1.8, 3.0)
AOR-2 (95% confidence interval)	1.5*** (1.2, 1.8)	1.4*** (1.1, 1.7)	1.3 (0.99, 1.6)	1.2 (0.9, 1.6)	1.2 (0.9, 1.5)	1.0 (0.8, 1.3)	1.4* (1.0, 1.8)
Chronic bronchitis/ Emphysema/COPD							
AOR-1 (95% confidence interval)	1.3* (1.1, 1.7)	1.3 (0.98, 1.6)	1.3 (0.98, 1.6)	1.4* (1.0, 1.8)	1.5** (1.2, 2.0)	1.5*** (1.2, 2.0)	2.0*** (1.4, 2.7)
AOR-2 (95% confidence interval)	1.1 (0.8, 1,4)	0.8 (0.6, 1.1)	0.9 (0.7, 1.3)	0.8 (0.5, 1.2)	1.1 (0.8, 1.6)	1.2 (0.9, 1.6)	1.6 (0.99, 2.5)
Diabetes							
AOR-1 (95% confidence interval)	1.2 (0.998, 1.5)	1.1 (0.9, 1.4)	1.1 (0.9, 1.4)	1.1 (0.8, 1.3)	1.2 (0.98, 1.6)	1.4* (1.1, 1.9)	1.1 (0.8, 1.6)
AOR-2 (95% confidence interval)	1.1 (0.9, 1.3)	1.0 (0.8, 1.2)	1.0 (0.8, 1.3)	0.8 (0.6, 1.2)	1.2 (0.9, 1.6)	1.3 (0.9, 1.8)	0.9 (0.6, 1.4)
Epilepsy							
AOR-1 (95% confidence interval)	0.9 (0.5, 1.6)	1.1 (0.7, 2.0)	1.1 (0.6, 2.0)	0.8 (0.4, 1.7)	0.9 (0.5, 1.8)	1.0 (0.5, 2.0)	1.2 (0.6, 2.6)
AOR-2 (95% confidence interval)	0.7 (0.4, 1.5)	1.0 (0.5, 2.1)	1.2 (0.4, 3.4)	0.6 (0.2, 1.7)	0.7 (0.3, 1.5)	0.8 (0.4, 1.5)	1.1 (0.5, 2.2)
Heart disease							
AOR-1 (95% confidence interval)	1.2 (0.97, 1.4)	1.2 (0.99, 1.5)	1.2 (0.9, 1.5)	1.2 (0.9, 1.6)	1.2 (0.96, 1.6)	1.3 (0.99, 1.7)	1.2 (0.8, 1.7)
AOR-2 (95% confidence interval)	1.0 (0.8, 1.2)	1.0 (0.8, 1.2)	0.9 (0.7, 1.2)	1.0 (0.7, 1.5)	1.0 (0.7, 1.5)	1.0 (0.8, 1.4)	0.9 (0.6, 1.3)
Cancer							
AOR-1 (95% confidence interval)	1.3** (1.1, 1.5)	1.3** (1.1, 1.6)	1.4** (1.1, 1.7)	1.5*** (1.2, 1.9)	1.5** (1.1, 1.9)	1.3** (1.1, 1.6)	1.7*** (1.3, 2.2)
AOR-2 (95% confidence interval)	1.1 (0.96, 1.4)	1.1 (0.9, 1.4)	1.1 (0.9, 1.4)	1.0 (0.7, 1.4)	1.1 (0.8, 1.5)	1.1 (0.9, 1.3)	1.3 (0.97, 1.7)
Stroke							
AOR-1 (95% confidence interval)	1.4* (1.0, 2.0)	1.7** (1.2, 2.4)	1.3 (0.9, 1.9)	1.5 (0.9, 2.5)	2.1** (1.3, 3.3)	1.4 (0.9, 2.1)	1.7 (0.98, 2.9)
AOR-2 (95% confidence interval)	1.2 (0.8, 1.6)	1.5* (1.0, 2.2)	1.0 (0.6, 1.6)	0.9 (0.4, 2.0)	1.7 (0.9, 3.3)	0.8 (0.5, 1.4)	1.0 (0.5, 2.1)
Bowel disease							
AOR-1 (95% confidence interval)	1.8*** (1.5, 2.2)	1.9*** (1.5, 2.3)	1.8*** (1.5, 2.3)	2.4*** (1.9, 3.1)	2.8*** (2.2, 3.7)	2.1*** (1.6, 2.6)	2.2*** (1.6, 2.9)
AOR-2 (95% confidence interval)	1.3** (1.1, 1.6)	1.2 (0.97, 1.5)	1.1 (0.8, 1.4)	1.0 (0.7, 1.5)	1.7** (1.2, 2.3)	1.2 (0.9, 1.6)	1.1 (0.8, 1.5)
Chronic fatigue syndrome							
AOR-1 (95% confidence interval)	2.6*** (1.7, 3.9)	2.8*** (1.8, 4.4)	2.5*** (1.5, 3.9)	3.2*** (1.8, 5.7)	3.0*** (1.8, 5.2)	3.0*** (1.9, 4.8)	2.6*** (1.5, 4.6)
AOR-2 (95% confidence interval)	1.3 (0.8, 2.1)	1.4 (0.8, 2.3)	1.1 (0.6, 1.9)	1.3 (0.6, 3.0)	1.0 (0.5, 1.9)	1.4 (0.8, 2.4)	0.9 (0.5, 1.8)
Any physical condition							
AOR-1 (95% confidence interval)	1.4*** (1.3, 1.6)	1.5*** (1.3, 1.7)	1.5*** (1.3, 1.7)	1.7*** (1.4, 2.0)	1.9*** (1.6, 2.3)	1.4*** (1.2, 1.7)	1.5*** (1.2, 1.9)
AOR-2 (95% confidence interval)	1.2*** (1.1, 1.4)	1.3** (1.1, 1.4)	1.1 (0.97, 1.3)	1.1 (0.9, 1.4)	1.4** (1.1, 1.7)	1.1 (0.9, 1.3)	1.0 (0.8, 1.3)

* significantly different from reference category ($p < 0.05$)
** significantly different from reference category ($p < 0.01$)
*** significantly different from reference category ($p \leq 0.001$)
AOR-1 = adjusted for sociodemographic variables (age, sex, visible minority status, country of birth, education, household income, and marital status), smoking, and obesity.
AOR-2 (Any child abuse) = adjusted for sociodemographic variables, smoking, obesity, any Composite International Diagnostic Interview mental disorder, any self-reported mental condition, and any other physical condition
AOR-2 (Any physical abuse) = adjusted for sociodemographic variables, smoking, obesity, any Composite International Diagnostic Interview mental disorder, any self-reported mental condition, any other physical conditions, and sexual abuse, and exposure to intimate partner violence
AOR-2 (Any physical condition) = odds ratios adjusted for sociodemographic variables, smoking, obesity, any Composite International Diagnostic Interview mental disorder, any self-reported mental condition, and other types of child abuse
Notes: Reference category is not experiencing specific type of abuse. Models excluded pregnant women because BMI was not calculated for these respondents.
Source: 2012 Canadian Community Health Survey—Mental Health.

Table 5
Adjusted odds ratios (AOR) relating selected physical conditions to number of types of abuse experienced in childhood, household population aged 18 or older, Canada excluding territories, 2012

	Number of types of child abuse			
Physical condition	**None†**	**One**	**Two**	**Three**
Asthma				
AOR-1 (95% confidence interval)	1.0	1.0 (0.8, 1.2)	1.2 (0.9, 1.6)	1.4 (0.8, 2.4)
AOR-2 (95% confidence interval)	1.0	0.9 (0.7, 1.1)	0.9 (0.6, 1.2)	0.9 (0.5, 1.5)
Arthritis				
AOR-1 (95% confidence interval)	1.0	1.2**[a] (1.1, 1.4)	1.7***[b] (1.4, 2.2)	2.2***[b] (1.6, 3.1)
AOR-2 (95% confidence interval)	1.0	1.1 (0.9, 1.2)	1.2 (0.9, 1.6)	1.4* (1.0, 2.0)
Back problems				
AOR-1 (95% confidence interval)	1.0	1.4***[a] (1.2, 1.6)	2.0***[b] (1.7, 2.4)	1.9***[b] (1.4, 2.5)
AOR-2 (95% confidence interval)	1.0	1.2* (1.0, 1.4)	1.5*** (1.2, 1.8)	1.0 (0.7, 1.4)
High blood pressure				
AOR-1 (95% confidence interval)	1.0	1.1 (0.98, 1.3)	1.1 (0.9, 1.3)	1.3 (0.9, 1.7)
AOR-2 (95% confidence interval)	1.0	1.0 (0.9, 1.2)	0.9 (0.7, 1.1)	1.0 (0.7, 1.4)
Migraine				
AOR-1 (95% confidence interval)	1.0	1.5***[a] (1.2, 1.7)	2.6***[b] (1.9, 3.4)	3.3***[b] (2.3, 4.9)
AOR-2 (95% confidence interval)	1.0	1.3**[a] (1.0, 1.5)	1.9***[b] (1.4, 2.6)	2.0***[b] (1.3, 3.0)
Chronic bronchitis/ emphysema/COPD				
AOR-1 (95% confidence interval)	1.0	1.0[a] (0.8, 1.3)	2.0***[b] (1.4, 2.7)	2.0**[b] (1.3, 3.0)
AOR-2 (95% confidence interval)	1.0	0.9[a] (0.7, 1.2)	1.4[b] (0.97, 2.1)	1.2[ab] (0.7, 1.9)
Diabetes				
AOR-1 (95% confidence interval)	1.0	1.1 (0.9, 1.4)	1.3 (0.98, 1.8)	1.4 (0.8, 2.4)
AOR-2 (95% confidence interval)	1.0	1.1 (0.9, 1.4)	1.1 (0.8, 1.6)	1.1 (0.6, 2.0)
Epilepsy				
AOR-1 (95% confidence interval)	1.0	0.8 (0.4, 1.7)	0.6 (0.2, 2.4)	1.9 (0.8, 4.5)
AOR-2 (95% confidence interval)	1.0	0.8 (0.3, 1.8)	0.5 (0.1, 2.0)	1.1 (0.4, 3.5)
Heart disease				
AOR-1 (95% confidence interval)	1.0	1.1 (0.9, 1.3)	1.3 (0.97, 1.9)	1.7 (0.9, 3.4)
AOR-2 (95% confidence interval)	1.0	0.9 (0.7, 1.2)	1.0 (0.7, 1.4)	1.2 (0.5, 2.5)
Cancer				
AOR-1 (95% confidence interval)	1.0	1.1[a] (0.9, 1.3)	1.7***[b] (1.3, 2.2)	2.1***[b] (1.4, 3.3)
AOR-2 (95% confidence interval)	1.0	1.0[a] (0.8, 1.2)	1.5**[b] (1.1, 1.9)	1.0[ab] (0.96, 2.5)
Stroke				
AOR-1 (95% confidence interval)	1.0	1.2 (0.8, 1.8)	2.0* (1.2, 3.5)	2.4* (1.2, 4.8)
AOR-2 (95% confidence interval)	1.0	1.0 (0.7, 1.5)	1.6 (0.8, 3.0)	1.2 (0.5, 2.8)
Bowel disease				
AOR-1 (95% confidence interval)	1.0	1.4***[a] (1.2, 1.8)	2.0***[b] (1.5, 2.7)	4.6***[c] (2.9, 7.2)
AOR-2 (95% confidence interval)	1.0	1.2[a] (0.96, 1.5)	1.3[a] (0.97, 1.9)	2.4***[b] (1.5, 3.9)
Chronic fatigue syndrome				
AOR-1 (95% confidence interval)	1.0	1.6*[a] (1.1, 2.6)	3.6***[b] (2.0, 6.5)	6.3***[b] (2.7, 14.9)
AOR-2 (95% confidence interval)	1.0	1.0 (0.6, 1.7)	1.6 (0.8, 3.3)	1.8 (0.7, 4.5)
Any physical condition				
AOR-1 (95% confidence interval)	1.0	1.3***[a] (1.1, 1.5)	1.8***[b] (1.4, 2.2)	2.2***[b] (1.4, 3.3)
AOR-2 (95% confidence interval)	1.0	1.1*[a] (1.0, 1.3)	1.5***[b] (1.2, 1.9)	1.5[ab] (0.9, 2.4)

* significantly different from reference category ($p < 0.05$)
** significantly different from reference category ($p \leq 0.01$)
*** significantly different from reference category ($p \leq 0.001$)
† reference category
AOR-1 = odds ratios adjusted for sociodemographic variables (age, sex, visible minority status, country of birth, education, household income, and marital status), smoking and obesity.
AOR-2 = odds ratios adjusted for sociodemographic variables, smoking, obesity, any Composite International Diagnostic Interview mental disorder, any self-reported mental condition, and any other physical condition.
Notes: AORs with different superscripts differ significantly ($p < 0.05$). Models excluded pregnant women because BMI was not calculated for these respondents. Because of rounding, some confidence intervals with 1.0 as the lower limit were significant.
Source: 2012 Canadian Community Health Survey—Mental Health.

physical health may also exist through mental conditions or physical co-morbidities. Individuals exposed to maltreatment in childhood may have emotional, cognitive, and behavioural responses such as substance abuse and overeating, which may be another pathway to health problems.[25,40,45,46] In the present study, these indirect pathways may be indicated by the AOR-2 models that become non-significant when adjusting for mental health conditions, other physical conditions, and other types of child abuse.

Strengths and limitations

The strengths of this study include: the use of recent data from a nationally representative Canadian sample; examination of three types of child abuse, 13 physical conditions, and self-perceived health; and adjustment for sociodemographic characteristics, obesity, smoking, mental disorders, other physical conditions, and other types of child abuse.

However, the results should be interpreted in the context of several limitations. The cross-sectional design precludes causal inferences about relationships between child abuse and physical conditions. Also, retrospective accounts of exposure to abuse in childhood may be subject to recall or reporting bias. Evidence supports the valid recall of adverse childhood experiences,[48-50] but ethical and practical constraints make it difficult to collect such information prospectively from a general population sample. Moreover, the CHMS—MH did not cover emotional abuse and neglect in childhood. As well, child abuse is associated with an increased likelihood of violence in adult relationships[51] and could contribute to health problems in adulthood, but intimate partner violence was not covered in the survey. In addition, physical conditions were based on self-reports and were not independently confirmed. Nonetheless, agreement between self-reports and physician-diag-

nosed conditions has been shown to be high.[52] BMI was computed using self-reported height and weight, which tend to introduce measurement error. Finally, the study adjusted for current socio-demographic characteristics rather than characteristics before age 16.

Conclusion

The results of this study underscore the association between three major types of child abuse and physical health conditions and perceived general health in adulthood. Given the relative paucity of information about the relationship between child abuse and physical health compared to mental health, clinicians may have a limited awareness of the role of child abuse in relation to physical conditions. It is important that such awareness is increased, since exposure to abuse in childhood may have implications for treatment of physical illnesses. From a public health perspective, it is increasingly recognized that prevention of child abuse has major implications for reduction in mental health problems, but it is also possible that reducing child abuse may lead to better physical health outcomes.

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